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"Western Treasure -- Deep, Wet Snow"

FEDERAL-STATE COOPERATIVE
SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for

COLORADO RIVER DRAINAGE BASIN

MARCH 1, 1948

By

Division of Irrigation, Soil Conservation Service
United States Department of Agriculture
and
Colorado Agricultural Experiment Station

Data included in this report were obtained by the agencies named above in cooperation with the U. S. Forest Service, National Park Service, State Engineers of Colorado, Wyoming and New Mexico and other Federal, State and local organizations.

WATER SUPPLY OUTLOOK

COLORADO RIVER DRAINAGE

March 1, 1948

Snow cover on the headwaters of the Colorado River and its tributaries in Colorado, as shown by March 1 snow surveys, was normal or slightly above at high elevations. In the valley areas the ground is covered with snow to a greater extent than usual due to cold weather and higher than average precipitation. Soil moisture is reported as good and stream flow is generally above normal except in extreme southwest Colorado. On the Green River watershed in Wyoming there is a deficiency in snow accumulation to date.

Drought conditions in Arizona and western New Mexico have been somewhat relieved during February but reservoir storage is still very low. Soil moisture conditions in irrigated areas are temporarily good due to recent rains.

COLORADO RIVER AND TRIBUTARIES IN COLORADO

Colorado River (Above Grand Junction). The snow cover on the Colorado River watershed, above Grand Junction, is 7 percent above normal and about the same as last year. The distribution of snow water storage over the watershed follows a general average pattern with no extreme deficiencies or surplus. At low and medium elevations precipitation has been above normal and snow melt has been light to date. Stream flow at Grand Junction is reported as about average. The irrigated and range areas have been snow covered much of the time during the winter. Storage in Green Mountain reservoir is now 74,500 acre-feet, the same amount as on March 1, 1947. The present outlook for flow of the Colorado at Grand Junction is for 10 to 25 percent above normal.

Gunnison River. The water supply situation on the Gunnison is now quite favorable. Although the snow water content measured on courses at high elevations is slightly under normal and last year, precipitation at low elevations has been high. During February up to three times normal precipitation was reported in valley areas. Stream flow is currently 20 percent over average. Soil moisture conditions in the Uncompahgre valley are excellent. A slight deficiency in snow cover is indicated for the North Fork. Storage in Taylor Park reservoir is 89,200 acre-feet as compared to 68,400 on March 1, 1947.

Yampa and White Rivers. Snow water content measured on courses on the watershed of the Yampa river March 1, was 8 percent above average and 10 percent over a year ago. The valley area is snow covered and recent temperatures have been colder than usual. Stream flow is about normal. On the headwaters of the White River a slight deficiency of snow cover is indicated but on the whole the water supply outlook for this stream is about average.

San Juan and Animas Rivers. In opposition to the snow pattern for the past three seasons the water supply outlook on the San Juan and Animas rivers is much above other tributaries to the Colorado River. During February there was record or near record snow accumulation in the mountains on this watershed from Wolf Creek Pass west along the Continental Divide and on to the headwaters of the Animas and its tributaries. Upper San Juan course measured 113 inches of water and 32 inches of snow to set a record depth for March 1, since 1935. Similar conditions were reported from Cascade snow course on the Animas River. Precipitation at lower elevations has been above normal and soil moisture conditions are excellent. Storage in Vallecito Reservoir is now 66,000 acre-feet. A year ago it was 58,300.

Dolores River. From limited snow surveys on the headwaters of the Dolores River the snow water content is about normal and 11 percent above March 1, 1947. Snow covers the ground at lower and medium elevations. Recent precipitation has been about average. Soil moisture conditions in the Dolores, San Miguel and Montezuma valleys are reported as good. Storage in Groundhog reservoir is 11,000 acre-feet, 3,000 above last year at this time.

GREEN RIVER IN WYOMING

On the basis of March 1 snow surveys on the Green River watershed in Wyoming a definite deficiency of snow cover is reported. The average snow water content is 74 percent of last year and 82 percent of normal. Precipitation over the range area has been near average during the winter months. No surveys were made west of Big Piney but the water content of the snow at East Rim Divide course and other precipitation records indicates better or near normal snow conditions in that area.

COLORADO RIVER AND TRIBUTARIES IN ARIZONA

The drought condition that has existed in Arizona for the past two seasons was somewhat relieved during February. The snow water content, as of March 1, was substantially above normal on most snow courses on the Gila, Salt, Little Colorado and Verde Rivers. Precipitation was reported as above normal in the irrigated areas the last two weeks of February. However, more than the temporary favorable conditions will be necessary to remedy the long continued period of drought in Arizona. Reservoir storage is extremely short and groundwater tables have been lowering. Stream flow is reported as below average. Unless heavy precipitation continues the water supply will still be short. Storage in the four major reservoirs on the Salt River is about 231,000 acre-feet as compared to 837,000 as an average for the past ten years. San Carlos reservoir is nearly empty.

Net storage in Lake Mead as of March 1 was 19,148,000 acre-feet, about 2,450,000 above last year on that date.

SNOW SURVEYS AND IRRIGATION WATER FORECASTS

COLORADO RIVER BASIN

STATUS OF RESERVOIR STORAGE, MARCH 1, 1948

BASIN AND STREAM	RESERVOIR	USABLE CAPACITY (Thous. A. Ft.)	THOUSANDS ACRES FEET IN STORAGE ABOUT MARCH 1, 1948					10-year-avg. 1937-46*
			1948	1947	1946	1945		
COLORADO DRAINAGE								
Taylor River	Taylor Park	106.2	89.1	68.4	83.4	60.9	59.1	
Los Pinos River	Vallecito	126.3	65.9	58.3	38.7	8.1	31.6	
Groundhog Creek	Groundhog	21.7	11.0	8.0	8.5	8.0	10.4	
Blue River	Green Mountain	146.9	74.5	74.7	66.8	70.1	52.6	
Colorado River	Lake Mead	27935.0	19148.0	16692.0	18275.0	19790.0	19867.4	
Colorado River	Lake Havasu	688.0	591.0	609.7	588.4	642.6	546.8	
SALT AND GILA DRAINAGE								
Salt River	Roosevelt	1420.0	30.6	133.6	433.8	606.9	580.2	
"	Horse Mesa	245.1	161.9	229.0	224.3	223.4	190.7	
"	Mormon Flat	58.0	25.8	39.0	31.4	35.5	39.1	
"	Stewart Mt.	70.0	13.1	28.1	10.8	22.2	27.0	
Verde River	Bartlett	200.0	8.3	11.3	1.8	15.6	58.9	
Aqua Fria River	Carl Pleasant	173.0	9.5	3.0	3.6	8.3	20.5	
Gila River	San Carlos	1200.0	1.3	18.3	29.9	107.5	249.3	

*Some for shorter periods

SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for

COLORADO RIVER BASIN

March 1, 1948

SUMMARY OF MARCH 1 SNOW SURVEYS AND COMPARISON OF DATA WITH THAT OF PREVIOUS

YEARS BY WATERSHEDS

WATERSHEDS	Snow Depth		Water Content		Number Courses in Average	Snow Density		1948 Water Content in percent of	
						Thirteen year Avg. *	1947	1948	Thirteen year Avg. *
	Thirteen year Avg. *	1947	1948	Thirteen year Avg. *	1947	1948	Percent	Percent	Percent
COLORADO RIVER	In.	In.	In.	In.	In.	Percent	Percent	Percent	Percent
Colorado River**	42.5	51.8	47.1	10.9	11.7	26	23	25	107
Yampa River	50.7	61.6	55.3	14.0	15.1	28	22	27	108
White River	47.2	65.7	50.8	13.4	12.6	28	22	25	94
Roaring Fork	34.0	42.4	37.2	7.8	8.2	23	19	22	105
Gunnison River	46.6	52.2	47.9	12.5	12.4	27	25	26	99
Uncompahgre River	38.6	45.6	45.0	11.0	11.3	29	25	25	103
Dolores River	33.6	33.2	41.5	8.0	7.8	24	21	19	97
San Juan River	41.2	38.1	54.7	11.7	14.8	28	26	27	126
Animas River	32.4	38.3	44.6	8.4	10.8	26	22	24	129
Gila River	7.5	0	16.6	2.0	3.5	27	---	21	175
Salt River	7.2	1.4	11.8	2.0	2.4	28	21	20	120
Green River	36.5	40.4	32.7	10.1	8.3	28	28	25	82

**Above Grand Junction *Some for shorter periods.

PRECIPITATION DATA

WATERSHED	STATE	Precipitation*		Departure from Normal		Precipitation*		Departure from Normal	
		October 1 to February 29	Inches	October 1 to February 29	Inches	February	Inches	February	Inches
Colorado	Colorado	8.23	8.23	+0.74	2.10	0.36	0.36	0.36	0.36
Green	Wyoming	3.52	3.52	-0.04	0.62	0.01	0.01	0.01	0.01
San Juan	New Mexico	6.20	6.20	-0.23	1.71	0.19	0.19	0.19	0.19
Colorado	Arizona								
Gila	New Mexico								

The accumulated precipitation since October 1 over the watershed of the Colorado River was below normal except for the Colorado River in Colorado. In February precipitation was above normal except for a slight deficiency on the Green River in Wyoming.

-5-
COLORADO RIVER SNOW SURVEYS, MARCH 1, 1948

DRAINAGE BASIN and SNOW COURSE	LOCATION				SNOW COVER MEASUREMENTS						
	No. and State	Sec.	Twp.	Range	Elev.	Date or Survey	Snow Depth (Inches)	Water	Content (Inches)	Years or Record	Past Record Av. Water Content (Inches)
COLORADO RIVER											
Above Grand Junction											
Park View*	7	Colo.	24	5N	73W	9200	3/2	35.3	7.1	13	7.2
Phantom Valley	12	"	7	5N	75W	9300	3/2	41.4	9.4	13	8.3
Berthoud Pass	16	"	35	2S	75W	9700	3/1	51.6	12.9	13	12.4
Tennessee Pass*	19	"	21	3S	80W	10200	2/26	36.0	7.7	13	7.3
Ind. Pass Tunnel	33	"	30	11S	82W	10200					
N. Lost Trail Cr.	34	"	20	11S	87W	9200	3/2	49.3	11.6	13	10.2
M. Fork Camp Cr.	37	"	16	3S	77W	9000	2/27	30.9	5.8	13	7.8
Fiddler Gulch	44	"	1	8S	80W	11000	2/26	50.9	12.8	13	11.9
Nast	45	"	1	9S	83W	8700	2/1	25.2	4.7	13	5.4
Mesa Lakes	56	"	35	11S	96W	10000	3/4	60.2	15.7	12	13.2
Lulu	59	"	25	6N	76W	10200	2/28	47.1	10.9	11	13.2
Willow Creek P.	62	"	1	4N	78W	9500	3/2	46.3	10.0	11	9.2
N. Inlet Grand L.	64	"	26	4N	75W	9000	3/1	41.0	10.1	11	7.3
Lake Irene	65	"	8	5N	75W	10600	2/29	70.1	19.5	11	15.7
Thunderbolt Peak	66	"	22	2N	74W	9500	2/29	48.3	16.5	11	13.1
Arrow	69	"	34	18	75W	8900	3/1	40.1	9.1	11	7.8
Lapland	70	"	16	2S	76W	9300	2/27	43.2	8.5	9	8.6
Fremont Pass #2	79	"	2	3S	79W	11400	2/25	53.8	13.6	13	12.0
Trickle Divide	85	"	23	11S	94W	10000	3/1	69.5	19.7	9	20.9
Lynx Pass No. 2	91	"	27	2N	83W	9100	3/21	47.8	13.3	13	10.6
Shrine Pass	96	"	15	6S	79W	10500	2/26	55.8	14.7	7	12.9
Grizzly Peak	97	"	2	5S	76W	11250	2/25	46.5	12.5	7	13.1
Ivanhoe	100	"	12	9S	82W	10400				3	
Glen-Mar Ranch	102	"	31	12S	77W	8350	2/27	30.8	5.6	2	7.2
Monarch Lake	106	"	30	2N	74W	8500	2/28	42.6	14.7	1	
				Average for drainage				47.1	11.7		10.9
YAMPA RIVER											
Dry Lake	6	Colo.	26	7N	84W	8200	3/1	51.3	14.8	10	14.9
Columbine Lodge*	8	"	21	5N	82W	9300	2/29	72.9	18.0	13	17.8
Elk River	9	"	6	10N	85W	8700	2/29	49.3	14.2	10	12.8
Lynx Pass No. 2*	91	"	27	2N	83W	9100	3/2	47.8	13.3	13	10.6
				Average for drainage				55.3	15.1		14.0
WHITE RIVER											
Burro Mountain	35	Colo.	15	2S	91W	9000	3/1	56.4	14.3	13	14.8
Rio Blanco	36	"	28	1N	88W	8500	3/1	45.2	11.0	10	11.9
*On adjacent drainage				Average for drainage				50.8	12.6		13.4

COLORADO RIVER SNOW SURVEYS, MARCH 1, 1948

DRAINAGE BASIN and SNOW COURSE		LOCATION			SNOW COURSE MEASUREMENTS								
		No. and State	Sec.	Twp. Lat.	Range Long.	Elev.	Date of Survey	Snow Depth (Inches)	Water Content (Inches)		Years of Record	Past Record Av. Water Content (Inches)	
COLORADO RIVER													
ROARING FORK													
Ind. Pass Tunnel	33 Colo.	30	11S	82W	10200								
N. Lost Trail Cr.	34 "	20	11S	37W	9200	3/2	49.3	13.3	17.4	11.6	13	10.2	
Nast	45 "	1	9S	83W	8700	3/1	25.2	9.0	10.8	4.7	13	5.4	
Ivanhoe	100 "	12	9S	82W	10400		—	5.1	5.2	—	13	—	
				Average for drainage			37.2	7.0	8.0	5.2	3	7.8	
GUNNISON RIVER													
Crested Butte	18 Colo.	22	13S	86W	9000	3/1	50.5	7.5	10.2	10.9	13	11.4	
Marshall Creek	42 "	24	48N	6E	10800	2/29	43.7	6.4	8.5	9.6	13	9.7	
Poncha Creek*	43 "	19	48N	7E	10500	2/29	34.0	4.5	6.0	9.2	13	8.0	
Park Cone	46 "	19	14S	82W	9700	3/1	32.3	5.5	7.4	8.2	12	7.2	
Alexander Lake	53 "	2	12S	95W	10000	2/26	62.1	10.3	21.0	17.5	12	17.6	
Snowshoe Mesa	55 "	14	13S	89W	7500	2/26	19.0	5.4	6.5	6.0	12	7.7	
Ironton Park	58 "	29	43N	7W	9800	3/5	45.0	5.9	11.3	11.3	12	11.0	
Trickle Divide	85 "	23	11S	94W	10000	2/27	69.5	14.1	24.5	19.7	9	20.9	
Park Reservoir	87 "	34	11S	94W	9500	2/27	66.4	11.3	24.0	19.0	9	19.7	
Porphyry Creek	89 "	19	49N	6E	10800	3/2	56.4	—	11.1	12.7	8	12.5	
Kannah Creek	101 "	5	12S	95W	10700	3/4	82.4	—	19.7	22.7	2	21.2	
Lake City	104 "	13	43N	4W	10300	3/1	37.9	—	—	6.9	1	6.9	
				Average for drainage			47.9	7.9	13.0	12.4		12.5	
UNCOMPAGHRE RIVER													
Ironton Park	58 Colo.	29	43N	7W	9800	3/5	45.0	5.9	11.3	11.3	12	11.0	
SAN JUAN RIVER													
Wolf Creek Pass*	26 Colo.	4	37N	2E	10000	3/2	95.4	10.0	20.0	27.7	12	22.1	
Upper San Juan	29 "	10	37N	1E	10000	3/2	113.7	10.9	21.6	32.4	11	24.1	
Silverton Sub. S.	30 "	10	41N	7W	9400	2/27	21.9	0.5	5.2	4.7	10	4.6	
Cascade	31 "	12	39N	9W	8850	2/29	66.8	2.8	9.0	16.5	10	9.6	
Granite Peaks	93 "	24	37N	6W	7950	3/4	40.6	2.0	0.6	9.6	8	7.6	
Chama Divide*	17 N. Mex.		36.9N	106.7W	7750	2/28	14.3	0.9	4.2	4.3	9	5.2	
Chamita*	18 "		36.9N	106.7W	8500	2/27	30.3	2.7	8.8	7.3	8	8.9	
				Average for drainage			54.7	4.3	9.9	14.8		11.7	

On adjacent drainage

*On adjacent drainage

COLORADO RIVER SNOW SURVEYS, March 1, 1948

DRAINAGE BASIN and SNOW COURSE		LOCATION				SNOW COURSE MEASUREMENTS							
		No. and State	Sec.	Twp.	Range	Elev.	Date of Survey	Snow Depth (Inches)	Water Content (Inches)		Years of Record	Past Record Av. Water Content (Inches)	
DOLORES RIVER													
23	Colo.	11		39N	11W	8700		---					
24	"	6		42N	8W	8600	2/27	43.0		4.1	5.7	10	6.8
25	"	24		41N	10W	10300		---		6.3	4.2	10	---
90	"	23		41N	13W	8900	3/1	40.0		13.4	6.9	10	---
						Average for drainage		41.5		7.8	5.8	8	9.7
										7.0	5.0		8.0
ANIMAS RIVER													
30	Colo.	10		41N	7W	9400	2/27	21.9		5.2	0.5	10	4.6
31	"	12		39N	9W	8350	2/29	66.8		9.0	2.8	10	9.6
58	"	29		43N	9W	9800	3/5	45.0		11.3	5.9	12	11.0
						Average for drainage		44.6		8.5	3.1		8.4
GILA RIVER													
11	N. Mex.	31		6S	20W	8000	2/27	23.8		0	0.5	11	2.2
14	"	6		6S	21W	8000	2/27	19.9		0	0.2	11	2.4
22	"	20		10S	10W	7850	3/1	1.2		0	0.0	7	0.3
23	"	6		11S	10W	7300	3/1	6.5		0	0.0	3	0.6
3	Ariz.	23		6N	30E	8500	2/27	14.8		0	0.5	11	2.0
4	"	13		4N	30E	8000	3/1	24.2		0	0.0	10	3.0
5	"	26		5N	30E	8000	2/27	20.0		0	T	11	3.3
						Average for drainage		16.6		0	0.2		2.0
SALT RIVER													
6	Ariz.	14		8N	23E	7200	3/1	11.5		0.8	0.4	10	2.4
7	"	2		9N	21E	6000	3/1	6.3		0	0.3	10	1.1
9	"	28		8N	23E	7000	3/1	6.6		0.5	0.0	7	1.1
3	"	23		6N	30E	8500	2/27	14.8		0	0.5	11	2.0
5	"	26		5N	30E	8000	2/27	20.0		0	T	11	3.3
						Average for Drainage		11.8		0.3	0.2		2.0

*On adjacent drainage.

COLORADO RIVER SNOW SURVEYS, March 1, 1948

DRAINAGE BASIN and SNOW COURSE		LOCATION				SNOW COURSE MEASUREMENTS								
		No. and State	Sec.	Twp.	Range	Elev.	Date of Survey	Snow Depth (Inches)	Water Content (Inches)			Years of Record	Past Record Av. Water Content (Inches)	
VERDE RIVER		COLORADO RIVER												
Iron Springs*	11 Ariz.	22	14N	3W	6200	2/26	4.0	1.0	0	0	0	3	0.3	
Camp Wood	12 "	3	16N	6W	5700	3/1	0	0	0	0	0	3	0	
Mingus Mountain	"	3	15N	2E	7100	3/1	8.0	1.5	0	--	--	2	0.7	
Mormon Lake*	"	13	18N	8E	7350	3/1	35.8	8.2	0	--	--	2	4.1	
Fort Valley*	"	22	22N	6E	7350	3/1	6.1	1.0	T	--	--	2	0.5	
Chalender*	"	27	22N	3E	7100	3/1	13.2	3.5	0	--	--	2	1.8	
Average for drainage							11.2	2.5	0	0	0		1.2	
LITTLE COLORADO RIVER														
Forestdale*	7 Ariz.	2	9N	21E	6000	3/1	6.3	1.5	0	0.3	10	1.1		
McNary	6 "	14	8N	23E	7200	3/1	11.5	1.6	0.8	0.4	10	2.4		
Nutriosio*	3 "	23	6W	30E	8500	2/27	14.8	3.4	0	0.5	11	2.0		
Mormon Lake	"	13	18N	8E	7350	3/1	35.8	8.2	0	--	2	4.1		
Fort Valley	"	22	22N	6E	7350	3/1	6.1	1.0	T	--	2	0.5		
Bright Angel	Ariz.	34	33N	3E	8400		30.1	6.0	--	--	1	--		
Grand Canyon	"	21	30N	4E	7500	2/1	6.1	3.5	--	--	1	--		
Average for drainage							14.9	3.1	0.2	0.2		2.0		
WILLIAMS RIVER														
Iron Springs	11 Ariz.	22	14N	3W	6200	3/1	4.0	1.0	0	0	3	0.3		
Camp Wood*	12 "	3	16N	6W	5700	3/1	0	0	0	0	2	0		
Willow Ranch	"	16	21N	11W	5000	3/1	0	0	0	--	2	0		
Average for drainage							1.3	0.3	0	0		0.1		
GREEN RIVER														
Mulligan Park	24 Wyo.	17	35N	103W	8900	2/28	28.6	6.4	12.5	9.9	7	8.9		
Kendall R.S.	25 "	23	38N	110W	7900	2/28	26.9	5.7	9.1	11.5	7	9.6		
Loomis Park	26 "	14	37N	111W	8500	2/28	44.2	11.8	15.0	15.8	7	13.1		
East Rim Divide	44 "	32	37N	111W	7950	2/26	31.0	9.1	8.2	9.5	7	8.9		
Average for drainage							32.7	8.3	11.2	11.7		10.1		

*On adjacent drainage

The following organizations cooperate in the snow surveys and irrigation water supply forecasts for the Colorado, Missouri-Arkansas and Rio Grande watersheds by furnishing funds or services.

STATE

- Colorado State Engineer
- Wyoming State Engineer
- Utah State Engineer
- New Mexico State Engineer
- Montana State Engineer
- Nebraska State Engineer
- Colorado Experiment Station
- Colorado Extension Service
- Montana Experiment Station
- Utah Experiment Station

FEDERAL

- Department of Agriculture
 - Forest Service
 - Soil Conservation Service
- Department of Interior
 - Bureau of Reclamation
 - Geological Survey
 - National Park Service
- Department of Commerce
 - Weather Bureau
- War Department
 - Army Engineer Corps

PUBLIC UTILITIES

- Colorado Public Service Company
- Western Colorado Power Company
- Montana Power Company
- Public Service Company of New Mexico
- Denver and Rio Grande Western R. R. Company

MUNICIPALITIES

- City of Bozeman
- City of Denver
- City of Boulder

WATER USERS ORGANIZATIONS

- 'Poudre Valley Water Users' Association
- Arkansas Valley Ditch Association
- Colorado River Water Conservation District

IRRIGATION PROJECTS

- Farmers Reservoir and Irrigation Company
- San Luis Valley Irrigation District
- Santa Maria Reservoir Company
- Costilla Land Company
- Uncompahgre Valley Water Users' Association
- Wyoming Development Company
- Goshen Irrigation District
- Kendrick Project
- Pathfinder Irrigation District
- Salt River Valley Water Users' Association
- San Carlos Irrigation and Drainage District
- Twin Lakes Reservoir and Canal Company

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